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In the Supreme Court
OF THE
United States

OCTOBER TERM, 1973

No. 73-1384

ARDAC, INC.; ADVANCE AUTOMATIC SALES CO., INC.; STANDARD CHANGEMAKERS, INC.; and PACIFIC NIK-O-LOK CO., INC., *Petitioners*

vs.

MICRO-MAGNETIC INDUSTRIES, INC., *Respondent*

PETITION FOR THE WRIT OF CERTIORARI to the United States Court of Appeals for the Ninth Circuit

CARL HOPPE,
2610 Russ Building,
San Francisco, California 94104
Attorney for Petitioners.

EDWIN W. OLDHAM,
First National Tower,
Akron, Ohio 44308,
Of Counsel for Ardac, Inc.

PERRY-LUCAS PRINTING CO. - 582 MISSION STREET - SAN FRANCISCO, CA 94105

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Petitioners pray that the Writ of Certiorari issue to review the judgment of the United States Court of Appeals for the Ninth Circuit entered in Appeal No. 72-2714 on November 2, 1973.

OPINIONS BELOW

The opinion of the Court of Appeals (App. A) is reported at 488 F.2d 770. That opinion affirms the case on the authority of the opinion of the District Court (App. B) reported at ..... F.Supp. ....., 175 U.S.P.Q. 331.

JURISDICTION

The judgment of the Court of Appeals was entered on November 2, 1973. A timely petition for rehearing (App. C) was denied on December 13, 1973 (App. D). Jurisdiction of this Court is invoked under 28 U.S.C. 1254(1).

STATEMENT OF THE CASE

Respondent brought the action below against petitioners for infringement of United States Patent 2,964,641, the Selgin II patent. The District Court found that a so-called Ardac machine infringed claims 1, 4 and 5 of that patent, enjoined petitioners from infringing those claims without a license from respondent, and awarded damages in the sum of $196,667.08 plus interest (App. B). The Court of Appeals affirmed on the opinion below (App. A).

The Selgin II patent covers a device to determine the authenticity of certain documents, including dollar bills (Finding 14, App. B). As found below, the invention combines seven elements, to wit: "... (1) the bill or document; (2) a light; (3) a mask or reticle; (4) an optical system for superimposing the image of the bill on the mask; (5) a shifter which moves the image of the bill relative to the mask; (6) an electric eye which converts light into electronic impulses; (7) a circuit means, responsive to certain predetermined electronic signals." (Findings 25 and 26, App. B).

Six of those seven elements are defined in claims 1 and 4, broken down, element by element, on page 3 of this petition. Claim 5 depends on claim 4 and need not be separately considered.

1. Apparatus for identification of (1) engravings, said engravings comprising a surface bearing a plurality of spaced, approximately parallel lines of a particular unique configuration and of substantial width, separated by spaces of different reflectance from said lines, said apparatus comprising

(3) a complementary surface bearing lines corresponding in configuration to the spaces of said first surface but of greater width,

(4) means for optically superimposing said two surfaces to produce a uniform optical effect over the combined surfaces when the two sets of lines are complementary and positionally matched,

(5) shifter means for shifting said surfaces with respect to each other in a first direction substantially perpendicular to at least some of said lines to produce a variation in the combined optical effect at a particular frequency determined by the distance between said lines and the speed of said shifting,

(6) photoelectric means responsive to said variations in optical effect to produce electrical signals at said particular frequency of occurrence corresponding to said variations,

(7) circuit means responsive to said signals, and tuned to said frequency to produce a control signal at a predetermined amplitude of said signal frequency.

4. Apparatus for identification of (1) documents having a plurality of equally spaced approximately parallel lines of a particular unique configuration and of substantial width separated by spaces of different reflectance from said lines comprising:

(3) a mask including a complementary surface having only a plurality of equally spaced lines corresponding to the configuration of said spaces between the lines of said documents;

(4) means for optically superimposing an image of said parallel lines upon the lines of said mask;

(5) shifter means for shifting said image with respect to said mask in a first direction perpendicular to at least some of said lines for a distance which is equal to the width of a plurality of said lines to produce a variation in the combined optical effect at a particular frequency determined by the distance between the lines and the speed of said shifting;

(6) photoelectric transducer means positioned adjacent to said mask and responsive to the variations of illumination to produce electrical signals at said particular frequency of occurrence;

(7) circuit components responsive to said electrical signals and adjusted to resonance at said frequency to produce a control signal at a predetermined amplitude; and electrical means for sensing the amplitude and frequency of said control signals.

On their face, the findings below show that the invention upheld is not the same invention as that defined in the claims. On their face, the findings do not even purport to embrace the same invention as that which is described in either the written description or the claims of the patent.

For one example, claims 1 and 4 both recite that a shifting of the mask with respect to the engraving on the bill or document serves "to produce a variation in the combined optical effect", broadly defining any variation in the intensity of the light which is projected through the mask and the engraving. The variation in combined optical effect as produced in the preferred embodiment of the invention is created by shifting the bill with respect to the mask. That shifting produces recognition signals which vary in light intensity. Total darkness is obtained when there is a superposition of the lines on the bill and the lines on the mask (Finding 32d, App. B). The specification describes the form of visual and electrical oscillations in Figures 4 and 6 and in the accompanying text which states that "total darkness is only obtained in the original position in which the two images exactly match" and "there will be times . . . when there will be no condition of total darkness at all . . . and at other times total darkness will only be approached." (App. E, col. 3, ll. 9 to 11 and 68 to 72).

In order to distinguish the Selgin II invention from a prior art Timms patent, the District Court redefined the Selgin II invention as not permitting "a variation" broadly, but instead as requiring the production of "multiple instances of complete darkness . . . for each movement

of the shifter" (Finding 51, App. B). As appears on the face of the Selgin II patent (App. E), there is not a word in either the specification or the claims which requires the 'multiple instances of complete darkness . . . for each movement of the shifter" thus imported into the claims to distinguish the prior art. Indeed, the restricted meaning thus given to the words "a variation in the combined optical effect" in the findings excludes the preferred embodiment of the Selgin II patent as well as the prior art. While there is a disclosure of "multiple instances of complete darkness (being) produced for each movement of the shifter" (App. E, Fig. 3, col. 2, l. 60 to col. 3, l. 5), that disclosure is used to explain the principles of the invention. That perfection is not obtained either in the machine described in the specification and drawings of Selgin II or in the prior art Timms machine. Petitioners urge that the imposition of that perfection upon the invention to avoid the prior art nullifies 35 U.S.C. 112.

Other examples of variance between the invention described in the findings and that described in the Selgin II specification and claims were pointed out below and in the interest of brevity are not recited in this petition. If this petition is granted, the preliminary showing of this petition can be expanded in petitioners' opening brief on certiorari.

In the District Court, petitioners were unsuccessful in obtaining any findings which were directed to the invention defined in the claims. In the Court of Appeals, the petitioners were unsuccessful in obtaining any review based upon the claim language either at the original hearing or on petition for rehearing.

QUESTIONS PRESENTED

1. Where the findings of a trial court which are clearly supported by the evidence uphold an invention which is not defined in the claims of the patent, do not those findings establish invalidity of the patent for failure to comply with 35 U.S.C. 112?

2. Is it proper for the findings of fact to uphold an invention which was not particularly pointed out and distinctly claimed in the patent?

3. Can obviousness be properly determined under *Graham v. John Deere Co.* (1966), 383 U.S. 1 without defining the claimed subject matter?

STATUTE INVOLVED

This petition involves the first two paragraphs of 35 U.S.C. 112 which recite:

> § 112. *Specification*
>
> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.
>
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

REASONS FOR GRANTING THE WRIT

1. The Court of Appeals concluded that "the trial court's findings of fact are clearly supported by the evidence" (App. A). A comparison of the findings (App. B) with the equally clearly stated text of the patent specification and claims (App. D) reveals that the specification does not have a written description of the invention described in those findings and that the claims do not particularly point out and distinctly claim that invention. In upholding a patent supported by such findings, the decision below conflicts with a coherent line of authorities which includes:

Permutit Co. v. Graver Corp. (1931), 284 U.S. 52, where this Court said, page 58:

> ". . . As the patentee has thus failed to give in the specification 'a written description' and has likewise failed particularly to point out and distinctly claim the free zeolite bed, as 'the part, improvement, or combination which he claims as his invention or discovery,' the patent is void."

Altoona Theatres v. Tri-Ergon Corp. (1935), 294 U.S. 477, where this Court said, page 487:

> ". . . The patent thus upheld is one which was neither claimed nor granted. . . ."

Stelos Co. v. Hosiery Corp. (1935), 295 U.S. 237, where this Court said, page 242:

> "Nowhere does the claim or the specification disclose the element that the fabric must not be tautly stretched over the holder, or that it must be so held that the tension can be varied. It is said that the use of the present participle 'stretching' rather than the

past participle 'stretched' makes the matter clear; but scrutiny of both claim and specification discloses no teaching as to the stretching of the fabric, or any regulation of the tension, or that it may not be tightly stretched over the holder and secured in that condition prior to commencing the repair. The specification of a 'suitable' holder certainly covers none of these alleged essentials. These omissions emphasize the failure to make the fair disclosure demanded by R. S. 4888 [Now 35 U.S.C. 112]."

2. In brushing aside petitioners' insistence upon the precision recited in 35 U.S.C. 112, the decision below deprives petitioners of the benefit of the judicial inquiry required by *United Carbon Co. v. Binney Co.* (1942) 317 U.S. 228, where this Court said, page 232:

"... The courts in determining the questions of invention and infringement brought to them by respondent, no less than the parties-litigant, need and may insist upon the precision enjoined by the statute..."

3. In refusing to consider the scope and sufficiency of the claims as a preliminary to the question of obviousness, the decision below frustrates strict observance of the requirements of *Graham v. John Deere Co.* (1966), 383 U.S. 1, 17:

"... Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved..."

The findings on the differences from the prior art (App. B, Findings 38-61) do not even purport to relate

differences to the claims at issue. The differences between the prior art "and the claims at issue" are not ascertained when the findings attribute novelty to features which are not defined in the claims.

4. Public policy warrants the expenditure of the time of this Court to review the issues presented herein. Application of 35 U.S.C. 112 is required in almost all patent litigation. The scope and sufficiency of claims "necessarily present themselves as preliminary problems in the resolution of" the ultimate issues of anticipation and non-infringement [per *United Carbon Co. v. Binney Co.* (1942), 317 U.S. 228, page 232]. Questions involving 35 U.S.C. 112 arise with frequency in the lower courts. The frequency with which they arise is attested by a cursory review of the petitions filed in the 1971, 1972 and 1973 terms. The statute has been invoked either primarily or in passing in the instances collected in Appendix F. Petitioners urge that patentees, putative infringers, and the courts below all need the reassurance of this Court that 35 U.S.C. 112 is a viable statute which must be applied as a matter of right whenever it is invoked. Petitioners urge that a strong stand on the statute is needed as much today as it was thirty years ago when this Court decided *United Carbon*. To remain effective, a statute, like a good tool, should be resharpened from time to time.

5. This case is an ideal vehicle for reappraising 35 U.S.C. 112. This case permits review with real judicial economy. No factual conflicts need be resolved to apply the statute. As decided below, the findings are clearly supported by the evidence. As shown on the face of the

patent, the specification and claims are drawn in clearly stated language. Mere comparison of the findings with the specification and claims proves that the invention upheld is one which was not defined as the invention in the specification and claims of the patent. Petitioners urge that the time is ripe to reinforce 35 U.S.C. 112 and that this case is a proper vehicle.

For the reasons stated, petitioners pray that the writ of certiorari be granted.

Respectfully submitted,

CARL HOPPE,

Attorney for Petitioners.

EDWIN W. OLDHAM,

Of Counsel for Ardac, Inc.

(Appendices Follow)

Appendix A

(Caption of United States Court of Appeals for the Ninth Circuit Appeal No. 72-2714 omitted)

Before CHAMBERS and DUNIWAY, Circuit Judges, and SKOPIL,* District Judge.

SKOPIL, District Judge:

Appellee, Micro-Magnetic Industries, Inc., sued appellants, Ardac, Inc. and its subsidiaries, for infringement of United States Patent No. 2,964,641, referred to as the Selgin II patent.

The suit upon the Selgin II invention was tried before the court which found that the Ardac machine infringed Claims 1, 4 and 5 of United States Patent No. 2,964,641. The court enjoined the defendants from infringing Claims 1, 4 and 5 without a license from Micro-Magnetic, and awarded damages for infringement based upon four percent of the price of Ardac's machine. Ardac appeals from that judgment.

Having reviewed the record, we have concluded that the trial court's findings of fact are clearly supported by the evidence. We agree with the trial judge's opinion and affirm the case on the authority thereof. That opinion is reported at ..... F.Supp. ..... (D.C. 1972).

Affirmed.

*Honorable Otto R. Skopil, Jr., United States District Judge, District of Oregon, sitting by designation.

Appendix B

(Caption of United States District Court for the Northern District of California in Civil Action C-48708 omitted)

WEIGEL, District Judge.

FINDINGS OF FACT

I. General Information

1. Plaintiff, Micro-Magnetic Industries, Inc., is a California corporation with its principal place of business in Palo Alto, California.

2. Plaintiff is the assignee of United States Patent No. 2,964,641, referred to hereafter as Selgin II to distinguish it from an earlier United States Patent, No. 2,646,717, referred to hereafter as Selgin I.

3. Plaintiff's machines are properly marked with the number of Selgin II.

4. Defendant ARDAC, sometimes referred to hereafter as defendant, is an Ohio corporation having its principal place of business in Chesterland, Ohio.

5. Defendant Advance Automatic Sales Co., Inc., is a California corporation having its principal place of business at San Francisco, California.

6. Defendant Pacific Nik-O-Lok Co., Inc., is a California corporation having a regular place of business in San Francisco, California.

7. Defendant Standard Change Makers, Inc., is an Indiana corporation having a regular place of business in San Francisco, California.

8. Defendant ARDAC has made and sold dollar bill validators known as Mark 2, Mark 4, Mark 5, and Mark 7 machines. All of these machines are equivalent to each other for the purposes of this case. A typical machine of the type manufactured by ARDAC will be referred to hereafter as defendant's machine.

9. Defendant Pacific Nik-O-Lok, Inc., has sold at least one of defendant's machines in this district.

10. Defendant Advance Automatic Sales Co., Inc., has sold at least one of defendant's machines in this district.

11. Defendant Standard Change Makers, Inc., has sold 6,631 of defendant's machines for a total selling price of $2,107,782. At least one of such machines was sold by Standard Change Makers, Inc., within this district.

12. Defendant ARDAC intervened in this action as a party defendant and waived any defense based on venue.

13. Defendant ARDAC has sold 26,297 of defendant's machines for a total selling price of $3,756,361. The above figure includes the sale of 6,631 of defendant's machines to Standard Change Makers, Inc. Based on the average selling price of $142.83, ARDAC received $2,808,895 for the 19,666 machines which it sold to persons other than Standard Change Makers, Inc.

II. Background Information

14. On December 13, 1960, United States Patent No. 2,964,641, referred to hereafter as Selgin II, was issued to Mr. Paul Selgin. The patent was for a device which would determine the authenticity of certain documents including dollar bills.

15. At the time when the application which matured into Selgin II was filed, the prior art contained, among others, the following United States Patents: (a) No. 2,646,717, issued on July 28, 1953, to Mr. Paul Selgin and referred to hereafter as Selgin I; (b) No. 2,731,621, issued on January 17, 1956, to Mr. C. G. Sontheimer and referred to hereafter as Sontheimer; (c) No. 2,827,822, issued on March 25, 1958, to Mr. R. L. Timms, and referred to hereafter as Timms.

16. In the fall of 1962, Mr. Riddle, president of plaintiff and Mr. McLaughlin, one of plaintiff's engineers, conceived of the invention, previously patented as Selgin II. At that time, they were unaware of Selgin II and considered their invention to be a major break-through in the art.

17. Mr. Riddle consulted patent counsel for the purpose of obtaining a patent on the invention. Patent counsel called Selgin II to Mr. Riddle's attention and advised him to attempt to acquire rights under the patent.

18. Subsequently, Messrs. Riddle and McLaughlin filed a patent application relating to improvements which they had made on Selgin II. This patent application matured into United States Patent No. 3,256,968. This Court has previously ruled on motion for summary judgment that all of the claims of that patent which plaintiff asserts against defendant are invalid.

19. Pursuant to attorney's advice, Mr. Riddle acquired all rights under Selgin II.

20. Starting in 1962, plaintiff made and marketed dollar bill validators which incorporated the Selgin II in-

vention. Plaintiff's sales rose from 15 machines in 1962 to 4500 machines in 1968.

21. Prior to 1967, defendant was a competitor of the plaintiff and produced a dollar bill validator which did not incorporate the Selgin II invention.

22. In the summer of 1967, the President of defendant attended a meeting in California concerning the fare collection equipment which would be used on the Bay Area Rapid Transit System. Upon returning to his company, defendant's president informed defendant's chief engineer, Jack Bayah, that a new design for defendant's machine was needed. The new design had to be capable of rejecting Xerox or photostatic copies of dollar bills, some of which would not be rejected by the machines which defendant had previously produced.

23. About two months prior to the meeting described above, Jack Bayah had analyzed plaintiff's machine, incorporating the Selgin II invention. Within two months after the meeting, Mr. Bayah designed a new bill validator for defendant which, plaintiff claims, incorporates Selgin II.

24. Defendant's machine is substantially cheaper than the plaintiff's. Shortly after defendant's machine was introduced, the rate of increase of plaintiff's sales began to decline. Thereafter, plaintiff's sales began to decline.

III. Description of the Invention

25. The Selgin II invention combines seven elements, which interact together to produce the results claimed in the patent.

26. The seven elements are: (1) the bill or document; (2) a light; (3) a mask or reticle; (4) an optical system for superimposing the image of the bill on the mask; (5) a shifter which moves the image of the bill relative to the mask; (6) an electric eye which converts light into electronic impulses; (7) a circuit means, responsive to certain predetermined electronic signals.

27. The bill to be examined must have on it a series of parallel or approximately parallel lines which are of different reflectance from the background on which they are printed. The parallel lines may be crossed by other lines so as to produce cross-hatching (see area to the right of George Washington's head on a $1 bill). Such cross-hatching will not interfere with the operation of the machine.

28. The light illuminates the portion of the bill to be examined.

29. The mask or reticle must contain a series of parallel lines which correspond to the spaces between the parallel lines on the bill. The lines on the mask may be, but do not have to be, wider than the spaces between the lines on the bill. The pattern on the mask is not affected by cross-hatching, and need not be a photo-negative of the area of the bill to be examined. The mask may be produced by many means of which photography and engraving are two.

30. The shifter moves the image of the bill in two directions, one parallel to the lines on the mask, (e.g., right-left) and one perpendicular to the lines on the mask (e.g., up-down).

31. The circuit means consists of an electronic brain which is tuned to respond to the frequency of the impulses generated by a genuine bill. When the proper signal is received, the circuit means signals peripheral equipment that a genuine bill has been accepted.

32. The invention, as shown in the preferred embodiment, works in the following manner:

a. When a bill is placed in the machine, the light (Fig. 1) shines on the bill.

b. The image of a small portion of the bill, containing the parallel lines, progresses through a series of lenses (Fig. 11) onto a mirror (Fig. 5).

c. The shifter, consisting of a motor and series of cams (Fig. 5a, 5b) causes the mirror to tilt cyclically on two axes, thus causing the image of the bill which is reflected off the mirror to move. The purpose of the shifter in making the image of the bill move is two-fold. First, it compensates for irregularities in the shape or positioning of the bill in the machine, thus insuring that the lines on the bill are aligned parallel to the lines on the mask. Second, it causes the image of the lines on the bill to move across the lines on the mask in a direction which is perpendicular to the direction of the lines.

d. As the shifter moves the image of the lines on the bill across the lines on the reticle or mask, the lines on the bill and the lines on the mask will at some times align so that the dark areas on the bill are superimposed over the transparent portions of the mask and so that the light areas on the bill are superimposed over the dark lines on the mask. At such a point, hereafter referred to as

"super-position", no light will pass through the mask to the electric eye. At other points, as the shifter moves the image of the bill, the lines on the bill and the lines on the mask will align so that the light areas between the lines on the bill will be superimposed on the transparent areas between the lines on the mask and so that the dark lines on the bill will be superimposed on the dark lines on the mask. At such a point, light from the bill will pass through the mask to the electric eye.

e. During *each* motion of the shifter, the image of the lines on the bill and the lines on the mask will go into and out of superposition many times, so that a series of pulses of light will pass to the electric eye. This series of pulses, produced by the interference of two sets of periodic functions, e.g., parallel lines, may be called a "Moiré effect".

f. The pulses of light falling on the electric eye are converted by the electric eye into a series of electric pulses.

g. The pulses of current are transmitted to the circuit component. If the proper frequency pulse is received, the circuit means transmits a signal to peripheral equipment that the bill is valid.

33. The frequency of the signal which is produced by the Moiré interference of the lines on the bill and the lines on the mask is dependent on the speed of the shifter and the width and spacing of the lines on the bill being tested.

34. The word "particular" in column 4, line 70 of the Selgin II patent refers, not to one frequency, but to a known or predictable frequency, dependent at any point in time on the particular speed of the shifter and the

particular width and spacing of the lines on the bill being examined.

35. Because the frequency produced by the Moiré effect is very sensitive to the width and spacing of the lines, the frequency is very sensitive to the sharpness with which the lines are printed. The signal produced is likewise very sensitive to the direction of the lines.

36. The lines on United States currency are one of the most difficult areas to duplicate because of the use of Intaglio Printing by the Bureau of Printing and Engraving. Photostatic copying machines cannot duplicate the fine lines which are printed thereby, nor can normal methods of printing.

37. The Selgin II invention, utilizing Moiré interference, has consequently produced a degree of precision in currency recognition not previously attained. The Selgin II invention has proved capable of detecting Xerox and photostatic copies.

IV. Differences from the Prior Art

38. Selgin I discloses an apparatus for identifying documents such as dollar bills by the comparison of such document with an exact photonegative of the document.

39. In Selgin I, the document is optically superimposed on the negative. The image of the document is moved so that at some point the dark areas of the negative are perfectly superimposed over the light areas of the bill. At such a point, no light will pass through the negative to the device which senses light.

40. The Selgin I device determines the authenticity of the document by testing for the perfect superpositioning of the negative and the bill.

41. The frequency with which the bill and the negative are perfectly superpositioned in Selgin I is determined solely by the speed with which the shifter moves. Total darkness can occur only once for each motion of the shifter.

42. Selgin II differs from Selgin I in that Selgin I inspects the entire document while Selgin II examines only a portion of the document.

43. Selgin II differs from Selgin I in that Selgin I uses a mask which is an exact photonegative of the bill examined while Selgin II uses a mask containing only parallel lines, which may be produced by means other than photography.

44. Selgin II differs from Selgin I in that in Selgin I, superposition of bill and negative occurs only once during each movement of the shifter, whereas in Selgin II, there are many such positions.

45. Selgin II differs from Selgin I in that in Selgin I, the frequency of perfect superposition is dependent solely on the speed of the shifter, whereas in Selgin II, the frequency is dependent on the speed of the shifter and the width and spacing of the lines. Because the frequency is dependent on the width and spacing of the lines, the Selgin II machine is capable of detecting forged and Xerox copies of dollar bills which the Selgin I machine would not detect.

46. The Selgin I patent was considered by the patent examiner before Selgin II was issued.

47. Timms, as Selgin II, examines only a small portion of the bill.

48. The area of the bill which Timms prefers to examine contains some lines such as those which may be examined by Selgin II.

49. Timms differs from Selgin II in that Timms applies to the small area of the bill the same process as was applied in Selgin I to the entire bill. Timms uses as a mask, an exact photonegative of the portion of the bill which is to be examined. Timms does not employ Moiré interference to determine the validity of the document examined.

50. The word "spurious" in Column 3, line 65, of the Timms patent refers to nearly perfect superpositioning of the bill and the negative (see Column 8, line 18) and not to the high frequency signal produced by Moiré interference.

51. Timms differs from Selgin II in that in Timms, total superpositioning of the bill and negative can occur only once during each passage of the image of the bill over the photonegative while in Selgin II, multiple instances of complete darkness are produced for each movement of the shifter.

52. Timms differs from Selgin II in that in Timms, the frequency with which perfect superpositioning of the negative and the bill occurs is dependent solely on the speed with which the shifter moves. In Selgin II, the frequency of perfect superpositioning is dependent on the speed of the shifter and the width and spacing of the lines on the bill.

53. Timms was considered by the patent examiner before Selgin II was issued.

54. The meaning of the word "spurious" and its relation to Selgin II was considered by the patent examiner before Selgin II was issued.

55. In Sontheimer, an electric eye detects light coming directly from a dollar bill through a small aperture, as the aperture moves across the face of the bill.

56. Sontheimer does not use a mask or reticle of any kind.

57. The electric eye in Sontheimer will produce a high frequency signal whenever the aperture scans across a series of parallel lines.

58. Because Sontheimer does not use a mask, precision analysis can be obtained only by controlling very precisely the speed with which the bill is scanned.

59. Selgin II differs from Sontheimer in that in Sontheimer, no mask or reticle is used.

60. Selgin II differs from Sontheimer in that in Sontheimer, Moiré interference generated by the interaction of two sets of parallel lines is not used.

61. Sontheimer was considered by the patent examiner before Selgin II was issued.

V. Obviousness

62. All of the prior art cited by defendants was considered by the patent examiner before Selgin II was issued.

63. Mr. Riddle is a man skilled in the currency recognition art.

64. In 1961, Mr. Riddle, without any knowledge of Selgin II, conceived of the use of Moiré interference in

currency recognition. At that time, he considered the invention unobvious and a breakthrough in the art.

65. Before this controversy began, Mr. Riddle believed that the validity of the Selgin II patent was conclusive.

66. In the opinion of Mr. Riddle, a man skilled in the currency recognition art and a man familiar with Timms, Selgin I, and Sontheimer, Selgin II would not have been obvious to one skilled in the art at the time the patent application was filed.

67. While Sontheimer, Timms, and Selgin I do disclose some elements of Selgin II, they do not teach the use of Moiré interference patterns as a means of identifying valid currency and it would not be obvious from such patents that such a means of currency recognition could be employed.

68. A third party, American Totalizator Company, saw sufficient merit in Selgin's work to take a license under his patents.

69. Defendant's chief engineer was unsuccessful in his attempts to design a machine of the quality of defendant's Mark 2-Mark 7 machines, despite his knowledge of the art, until he analyzed plaintiff's machine which employed Moiré analysis.

70. The invention of Selgin II was not obvious to one skilled in the art at the time the Selgin II application was filed, and added a novel means to the methods then available or obvious from the prior art by which currency recognition could be achieved.

VI. Infringement

71. In Selgin II, a portion of the bill is examined having parallel lines on it. In defendant's machine, a portion of the bill is examined having parallel lines on it.

72. In Selgin II, a light is used to illuminate the bill. In defendant's machine, a light is used to illuminate the bill.

73. In Selgin II, a mask or reticle is used which need not be photonegative of the portion of the bill examined. Rather, the mask or reticle consists solely of a series of parallel lines which correspond in width to the spaces between the parallel lines on the bill which are to be examined. The lines may be, but do not have to be, larger than the spaces between the lines on the bill. The mask contains parallel lines even if the area of the bill to be surveyed has cross-hatching on it. The defendant's machine contains a mask or reticle consisting of a series of parallel lines which correspond in width to the spaces between the lines which are to be examined. The mask or reticle in defendant's machine is not a photonegative and does not show cross-hatching which occurs in the area examined. The mask or reticle in defendant's machine is the same as and serves the same function as the mask or reticle in Selgin II.

74.a. In Selgin II, the shifter consists of the motor and cams which move the mirror in two directions, thus moving the image of the bill relative to the mask in two directions. One direction of motion compensates for irregularities in the placement of the bill in the machine and in the size of the bill and insures that the image of the lines on the bill is properly aligned with the lines on the

reticle. The second direction of movement insures that, given proper alignment, the lines on the bill pass over the lines on the reticle.

b. In defendant's machine, the platform onto which the bill passes for examination is so constructed as to automatically place the lines on the bill and the lines on the reticle in proper alignment. The reticle is suspended in a tube which holds it directly above the portions of the bill to be examined. A spring causes the tube, and hence the reticle, to move across the bill, thus causing the image of the lines on the bill to move across the lines on the reticle.

c. It was known, prior to the filing of Selgin II, that one direction of movement could be eliminated when the bill was properly placed in relation to the reticle or mask. (See Selgin I, column 3, lines 68-72). Attaching a spring to the reticle was an obvious substitute for motor driven movement at the time when Selgin II was filed.

d. The platform and spring driven tube in defendant's machine perform the same function, i.e., insuring that the lines on the bill will be made to pass over the lines on the reticle in proper alignment, as does the shifter in Selgin II. The means used by defendant were a known substitute for the means employed in the preferred embodiment of Selgin II at the time Selgin II was filed.

75. In Selgin II, the image of the lines on the bill is projected onto the reticle by means of a system of lenses and a mirror. In defendant's machine, the image of the lines on the bill is transmitted to the reticle by placing the reticle in a position directly above and almost in contact with the bill itself. It was known prior to the filing

of Selgin II that the system of lenses used in the preferred embodiment of Selgin II could be dispensed with and the bill and reticle placed in physical proximity to each other. (See Selgin I, column 3, lines 65-68.) The physical positioning of mask and bill in defendant's machine performs the same function as the lens system in Selgin II. The means used in defendant's machine were a known substitute for the means shown in the preferred embodiment of Selgin II at the time when Selgin II was filed.

76. Selgin II requires the use of photo-electric means for converting the light which passes through the mask or reticle into a series of corresponding electrical impulses. Defendant's machine uses a solar cell, a device invented after Selgin II was filed. A solar cell converts light which falls upon it into corresponding electronic impulses. For the purposes of the invention, the solar cell performs exactly the same function as the photocell required by Selgin II.

77.a. According to Claim 1 of Selgin II, the circuit means or electronic brain of Selgin II is tuned to transmit a signal to peripheral equipment whenever the frequency and amplitude of the electronic signal coming from the photoelectric cell indicates that a valid bill has been introduced. The electronic brain in Selgin II is tuned so as not to respond to the relatively lower frequency variations produced solely by the movement of the shifter (compare Ex. 6, Fig. 6[a], with Ex. 6[b] and Ex. 6, Fig. 4) but only to the relatively higher frequency variations in the signal produced by Moiré interference. According to Claim 4, said circuit means may be constructed so that when a signal of the proper frequency is introduced, the

signal will resonate within the circuit, causing it to increase in amplitude. When the frequency and amplitude of the original signal are correct, resonance in the circuit will build to a predetermined amplitude, which will trigger a signal to peripheral equipment.

b. The circuit means or electronic brain in defendant's machine consists of a band pass amplifier and integrator. The electronic brain in defendant's machine is also tuned so as to respond only to the frequencies produced by Moiré interference. The electronic brain in defendant's machine accumulates the charges which result from reception of the signals produced by Moiré interference until the accumulated charge reaches a predetermined level. Peripheral equipment is then signaled that a valid bill has been accepted.

c. The use of an amplifier and integrator was a known method of recognizing high frequency signals at the time when Selgin II was filed. (See Sontheimer, column 6, lines 8-26.) The electronic brain used to determine the presence of the signals produced by Moiré interference in defendant's machine serves the same function as the electronic brain in Selgin II. The means used in defendant's machine were a known equivalent to the means used in the preferred embodiment of Selgin II at the time when Selgin II was filed.

VII. Damages

[1] 78. Defendant's currency validator employs many means for detecting counterfeit currency, but of these, the most important is the one which employs the Selgin II invention. Without this portion of the device, the machine would have no commercial application.

79. Most currency validators contain more than one means of detecting counterfeit currency.

80. Since the Selgin II invention provides the most essential test of any employed by the defendants, a reasonable royalty should be measured by the total selling price of the machine rather than by the cost of one or more elements of the machine.

81. Under the circumstances of the case and in view of the fact that the royalty will be based on the total selling price of the defendant's machines, a reasonable royalty for past infringement by each defendant is four percent (4%) of the sum received for each machine.

82. This is not an exceptional case, justifying the award of either attorneys' fees or increased damages.

Conclusions of Law

1. The Court has jurisdiction over the parties and the subject matter and venue is properly laid.

2. United States Patent No. 2,964,641, referred to herein as Selgin II, is valid.

3. Defendant's machine infringes Claims 1, 4 and 5 of United States Patent No. 2,964,641, referred to herein as Selgin II.

4. Judgment should be entered for plaintiff and against defendants Pacific Nik-O-Lok Co., Inc., and ARDAC, jointly, in the amount of $5.71.

5. Judgment should be entered for plaintiff and against defendants Advance Automatic Sales Co., Inc., and ARDAC, jointly, in the amount of $5.71.

6. Judgment should be entered for plaintiff and against defendants Standard Change Makers, Inc., and ARDAC, jointly, in the amount of $84,311.28.

7. Judgment should be entered for plaintiff and against defendant ARDAC in the amount of $112,344.38. In no case should the total amount which plaintiff collects from defendant ARDAC exceed $150,254.44.

8. Plaintiff should collect costs and seven percent (7%) interest on the judgment from the date thereof.

9. An injunction should issue restraining defendants and their agents and privies from further violation of United States Patent No. 2,964,641.

JUDGMENT FOR DAMAGES AND INJUNCTION

This cause having been considered by this Court upon the pleadings and evidence presented on trial and upon the briefs of the parties submitted on defendant's Motion for Reconsideration, it is:

Ordered, adjudged, and decreed:

1. United States Patent No. 2,964,641 is valid as to all its claims and plaintiff is the lawful owner thereof with the right to recover for past infringement thereof.

2. Defendants and each of them have infringed Claims 1, 4 and 5 of Letters Patent No. 2,964,641.

3. A writ of injunction shall issue out of and under the seal of this Court directed to the defendants and each of them and their officers, agents, attorneys, employees, associates, and privies, enjoining and restraining them and each of them from infringing Claims 1, 4 and 5

of Letters Patent 2,964,641 during its term without a license from plaintiff.

4. Plaintiff shall recover damages for infringement of the patent in the following amounts:

a. From Pacific Nik-O-Lok Co., Inc., and ARDAC, jointly, in the amount of $5.71.

b. From Advance Automatic Sales Co., Inc., and ARDAC, jointly, in the amount of $5.71.

c. From Standard Change Makers, Inc., and ARDAC, jointly, in the amount of $84,311.28.

d. From ARDAC in the amount of $112,344.38.

5. In no case shall the total amount which plaintiff collects from defendant ARDAC exceed $150,254.44.

6. Plaintiff shall recover costs and interest on the judgment at the rate of seven percent (7%) per annum from the date hereof.

7. United States Patent No. 3,256,968, issued June 21, 1966, to John B. Riddle and Robert B. McLaughlin is invalid and void as to Claims 1-3 and 5-11 thereof. Defendants do not infringe Claims 4 and 12-17 of said patent.

8. Counsel for plaintiff shall promptly prepare, serve and submit a permanent injunction for approval and issuance by the Court in accordance with the foregoing Findings and Conclusions.

Appendix C

(Caption for the United States Court of Appeals for the Ninth Circuit in Appeal No. 72-2714 omitted)

COMBINED PETITION FOR REHEARING
and
SUGGESTION OF APPROPRIATENESS OF A REHEARING IN BANC

Most respectfully, Ardac, Inc. et al. petition this Court to grant rehearing and reargument. In its opinion of November 2, 1973, this Court concluded "that the trial court's findings of fact are clearly supported by the evidence." Accepting that determination as a datum, we urge that, as a consequence of those findings, defendants are entitled to a judgment that the Selgin patent in suit is invalid for failure to comply with 35 U.S.C. 112. That statute requires that the specification "shall contain a written description of the invention" and that it "shall conclude with one or more claims particularly pointed out and distinctly claiming the subject matter which the applicant regards as his invention".

The rejection by the Court of our argument based upon non-claimed features stands out in vivid contrast to another opinion of the Court handed down four days later on November 6, 1973 wherein the Court rejected "the trial court's finding of non-obviousness as clearly erroneous because it is based upon a function not claimed in the patent . . ." [Slip Opinion in Appeal No. 72-1556—*Klingensmith et al. v. Burgess & Associates, Inc.* before Circuit Judges Browning and Wright and District Judge Solomon].

As we pointed out in our opening brief, page 46, "the findings establish that the specification fails to contain a written description of the invention and the claims fail to point out particularly and distinctly" in six enumerated respects. As we pointed out in our reply brief, page 2, "In 20 pages of argument, Micro-Magnetics does not pretend to show that the invention upheld in this case is either described in the written description or claimed in the claims."

At the oral argument, counsel for Micro-Magnetic Industries, Inc. failed to show that the claims and written description embrace the invention described in the findings. The findings on their face do not even purport to embrace the same invention as that described in either the written description or the claims of the patent—either in distinguishing the prior art or in finding infringement.

For example, Claims 1 and 4 both recite that the shifting of the mask with respect to the engraving serves "to produce a variation in the combined optical effect". Neither the claims nor the written description purport to limit the broad words thus quoted to the so-called "Moire effect". Yet the findings which this Court concludes are supported by the evidence require a limited definition not recited in the claims in order to distinguish the Timms prior art patent. This is established by approved Finding 51 (App. C 11):

> "51. Timms differs from Selgin II in that in Timms, total superpositioning of the bill and negative can occur only once during each passage of the image of the bill over the photonegative while in Selgin II, multiple instances of complete darkness are produced for each movement of the shifter."

For another example, Claim 1 calls for "circuit means . . . tuned to said frequency", and Claim 4 calls for circuit components . . . adjusted to resonance at said frequency". Said frequency is defined in each of Claims 1 and 4 as being "a particular frequency determined by the distance between said lines and the speed of said shifting". There is only one specific frequency at which a tuned circuit resonates (please see our opening brief, pages 50-51). Finding 34, now approved by this Court, expands the invention (App. C 8):

> "34. The word 'particular' in column 4, line 70 of the Selgin II patent refers, not to one frequency, but to a known or predictable frequency, dependent *at any point in time* on the particular speed of the shifter and the particular width and spacing of the lines on the bill being examined."

These two examples highlight the plasticity with which the findings describe the invention. The findings define an invention narrower than the claims recite to distinguish Timms. They define an invention broader than the claims recite to make out infringement. The findings thus prove, "The patent thus upheld was one which was neither claimed nor granted" [per *Altoona Theatres v. Tri-Ergon Corp.* (1935), 294 U.S. 477, at page 487, quoted our opening brief, page 52].

In the light of this unrebutted showing, we respectfully urge that rehearing should be granted to dispose definitively of the issue as to whether the Selgin patent complies with 35 U.S.C. 112—our Issue No. 1, set forth in our opening brief at page 1 and argued at pages 46 through 53.

We submit most respectfully that defendants were entitled to a determination of this issue, for it was not a technical one of passing importance. It was the primary issue on appeal. While *United Carbon Co. v. Binney Co.* (1942), 317 U.S. 228 was not brought to the attention of this Court, it emphasizes, at page 232, the philosophy of the authorities which we did cite on the issue:

> ". . . Petitioner seeks reversal on the grounds of anticipation and non-infringement. The scope and sufficiency of the claims in suit necessarily present themselves as preliminary problems in the resolution of these ultimate issues. The courts in determining the questions of invention and infringement brought to them by respondent, no less than the parties-litigant, need and may insist upon the precision enjoined by the statute. To sustain claims so indefinite as not to give the notice required by the statute would be in direct contravention of the public interest which Congress therein recognized and sought to protect. Cf. *Muncie Gear Works v. Outboard, Marine & Mfg. Co.*, 315 U.S. 759."

With those strong words establishing the right of the courts and parties-litigant alike to "insist upon" statutory compliance, we urge that reargument should be granted to enable us to obtain a definitive ruling on the statutory issue.

In sustaining the findings below based upon concepts not clearly defined in the claims, this Court has effectively minimized the *stare decisis* effect of other opinions of the Court as announced in cases such as *Klingensmith et al. v. Burgess & Associates* (cited above); *Hewlett-Packard Co. v. Tel-Design, Inc.* (9th Cir. 1972), 460 F.2d

625, at page 629, footnote 9 (cited at page 55 of our opening brief); *Volvo, Inc. v. Cummings & Sandler, Inc.* (9th Cir. 1971), 435 F.2d 981, at page 982 (cited in *Hewlett-Packard*): and *Aerotec Industries of California v. Pacific Scientific Company* (9th Cir. 1967), 381 F.2d 795 and 799 (cited in our opening brief at page 44).

We suggest that the manifest divergence between the result in this case and the result in the cited authorities based upon analogous factual and legal considerations is a proper subject for rehearing *in banc* to secure and to maintain uniformity of decision on the need for adherence to 35 U.S.C. 112 [Rule 35(a), Rules of Appellate Procedure].

Respectfully submitted,

CARL HOPPE,

Attorney for

Defendants-Appellants.

EDWIN W. OLDHAM,

Of Counsel for Ardac, Inc.

Appendix D

(Caption for the United States Court of Appeals for the Ninth Circuit in Appeal No. 72-2714 omitted)

Before: CHAMBERS and DUNIWAY, Circuit Judges, and SKOPIL,* District Judge

The petition for rehearing is denied and the suggestion for a rehearing en banc is rejected.

All judges of the court have been notified of the suggestion for a rehearing en banc and no judge has requested a rehearing en banc.

*Honorable Otto R. Skopil, Jr., United States District Judge, District of Oregon, sitting by designation.

Appendix E

Dec. 13, 1960 P. J. SELGIN 2,964,641

DEVICE FOR IDENTIFICATION OF ENGRAVED DOCUMENTS

Filed April 26, 1957 2 Sheets-Sheet 1

FIG. 1

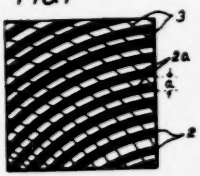
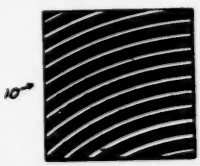


FIG. 2



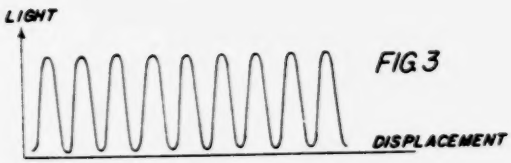


FIG. 3

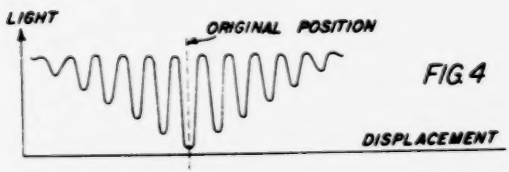


FIG. 4

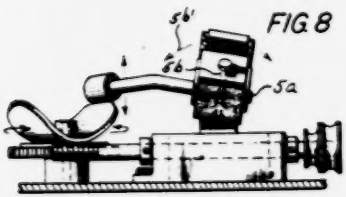


FIG. 8

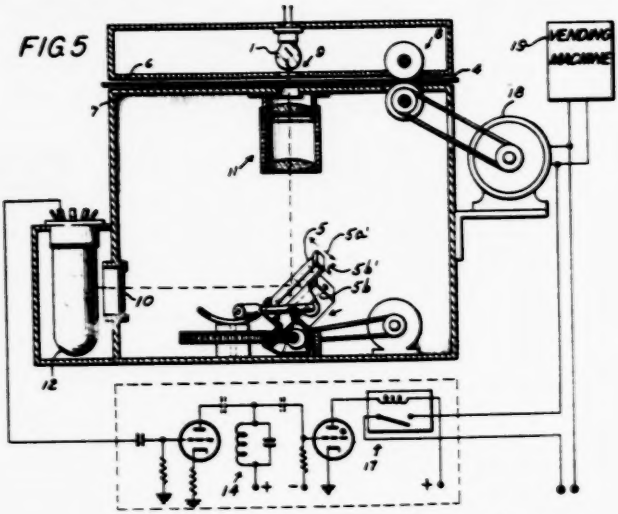
INVENTOR
PAUL J. SELGIN
BY Oliver L. Lehman
ATTORNEY

Dec. 13, 1960 P. J. SELGIN 2,964,641

DEVICE FOR IDENTIFICATION OF ENGRAVED DOCUMENTS

Filed April 26, 1957 2 Sheets-Sheet 2

FIG 5



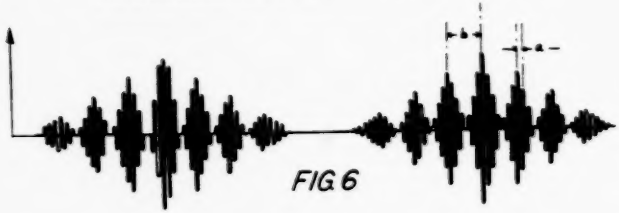


FIG 6



FIG 7

INVENTOR
PAUL J. SELGIN

BY Oscar L. Libman

ATTORNEY

United States Patent Office 2,964,641 Patented Dec. 13, 1960

2,964,641

DEVICE FOR IDENTIFICATION OF ENGRAVED DOCUMENTS

Paul J. Selgin, 5310 Reno Road NW., Washington, D.C.

Filed Apr. 26, 1957, Ser. No. 655,266

6 Claims. (Cl. 250—219)

This invention relates to the identification of documents and more particularly to the identification of engravings or other prints in which a pictorial representation is produced by a number of fine lines of varying configuration, and has for its primary object the provision of novel means for automatically identifying a particular document so engraved.

An important object of the invention is the identification of paper currency, which typically contains substantial areas of such fine engraved lines.

My prior U.S. Patent No. 2,646,717 discloses an apparatus for identifying documents such as paper currency by the comparison of such documents with an authentic copy of the same or an identical reproduction thereof, by optical superposition of a positive and a negative image which are oscillated with respect to each other so as to insure substantial coincidence of the images periodically. By means of a photoelectric system an electric signal is produced at the frequency of oscillation in a particular direction, and a tuned electric circuit is employed to detect the periodic signal.

The present invention constitutes an improvement over the disclosure of my prior patent and takes advantage of the multiplicity of fine lines of which an engraving or similar print is formed to produce a more distinctive frequency effect uniquely related to a particular document to be identified; and does not require an actual copy or negative of the document, but instead employs a master reference optical matrix which is uniquely related to a document sought to be identified.

A major object of the invention is the provision of an identification device for the recognition and authentification of genuine paper currency for automatic vending and other purposes.

Another object is the provision of relatively simple means for document identification which does not require the entire document to be inspected but inspects instead a selected area or selected areas of the document to produce a reliable indication of authenticity.

According to the invention, an image of at least a portion of the engraved pattern is superimposed on a surface bearing an optical representation of the spaces between the lines forming said image, but not necessarily an exact optical representation of said spaces.

The variations in light produced by moving these images relative to each other are photoelectrically transformed into electric signals and these signals are detected by means of a tuned circuit, and may be used to actuate an indicating device, a vending device, etc., as desired.

The specific nature of my invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings, in which:

Fig. 1 is a representation of a portion of an engraving on an enlarged scale;

Fig. 2 is a representation of the matrix used to identify the engraving of Fig. 1;

Fig. 3 is a schematic graph used to explain the principles of the invention.

Fig. 4 is a graphic representation of the signal output typically obtained according to the invention;

Fig. 5 is a schematic diagram of the structure and circuitry embodied in one form of the invention; and

Fig. 6 is a graph showing a typical group of recognition signals produced when an engraving is identified.

The invention utilizes an optical system which projects an enlarged image of a small portion of the engraved pattern upon a screen. This image will have the appearance of a series or family of approximately parallel lines. In general these will be curved and of uneven thickness, and there may be a cross-hatching due to the presence of a secondary series of lines crossing the first. Such an image is shown for the sake of example in Fig. 1, in which the curved major lines of the engraving are represented at 2 and the secondary series of lines is represented at 3. Considering the particular pair of lines identified by the reference character 2a, it will be noted that the spacing between these two is designated as "a."

Referring to Fig. 5, the document which is to be identified is shown at 4 as positioned between two plates 6 and 7, which are spaced sufficiently close together to maintain the document reasonably flat, and is held pinched between two rollers 8, between which it has been positioned by means forming no part of the present invention. The plates 6 and 7 are opaque except in the area generally designated by the reference character 9, where an aperture is provided whereby the light from electric lamp 1 can shine directly through the relatively thin paper on which the engraving is printed whereby an image may be projected through lens system 11 which is reflected by means of mirror 5 through a template 10 onto photocell 9. The template 10 bears upon its surface a transparent or translucent sheet or plate on which are drawn opaque lines or bands in such a manner that they completely cover the illuminated areas between the lines 2 of Fig. 2. Fig. 2 is a representation of a template corresponding to the engraved area shown in Fig. 1. In Fig. 2 the light bands 2a' correspond generally to the dark bands 2a of Fig. 1, except that they are narrower. The dark bands in Fig. 2 correspond to the spaces of Fig. 1, except that they are wider. It will thus be apparent that the lines of the template are essentially parallel to the image lines of Fig. 1 and have no relation to the secondary cross-hatching lines 3, if such exist in this portion of the engraving. The latter lines are non-essential to the operation of the device. It will be noted that the template of Fig. 2 in no way constitutes a reproduction, even partial, of the original. Template bands alternate with image lines and do not coincide therewith. Their thickness is not necessarily the thickness of spaces between the image lines but is preferably greater, and cross-hatching, if it exists, is ignored. Hence, the template is not a true negative, but instead is a geometric striation bearing a unique relationship to the original image.

The principle of operation will now be explained before considering the actual operation of the device. It will be assumed that the template of Fig. 2 is superimposed upon the image of Fig. 1 (or vice versa), and that they are moved relatively to each other, for example, in the "vertical" direction (up or down). To simplify the reasoning, we will initially assume that lines of the image and also those of the template are exactly parallel to one another, although not necessarily straight. The light transmitted through or reflected from the screen will be completely cut off every time that the bands of the template fall upon the spaces of the image. This condition which we will call "total darkness" will therefore occur repeatedly at a definite rate or frequency, which

depends upon the vertical motion velocity, and the pitch of the lines. If the amount of transmitted (or reflected) light is plotted against vertical displacement, a plot similar to Fig. 3 will result, under the assumed conditions of perfect parallelism.

Now consider what happens if the lines are not exactly parallel but only approximately so, i.e., when the image of Fig. 2 is displaced laterally from that of Fig. 1, and is then again moved vertically as before. In this case, total darkness is only obtained in the original position in which the two images exactly match. Vertical motion will no longer reproduce perfect coverage of illuminated areas by the template lines, since this is possible only in the original position and on the average, more and more light will be transmitted as the lateral distance from the original position is increased. When the displacement has proceeded far enough so that the relationship of the two images is purely random, then a certain average amount of light will be transmitted from any super-imposed relative position of the two images. A plot of transmitted light in this case will therefore have the appearance of Fig. 4, which covers displacements on both sides of the original position.

Referring to Figs. 5 and 8, it will be seen that means have been provided for superimposing the original image on the template, and that it is now necessary to provide also means for producing the desired relative motion. This is accomplished by means of mechanism for oscillating mirror 5 simultaneously in two directions so as to produce a "fast" oscillation around an axis 5a (Fig. 8) perpendicular to the drawing as indicated by the arcuate arrow 5a' (Fig. 5) and a "slow" oscillation around an axis 5b parallel to the drawing as indicated by the arrow 5b' in Fig. 8. The amplitude of these oscillations should be made sufficient to insure that at some point during the slow oscillation cycle, perfect superposition of the two images will occur. This therefore requires that the amplitude of the oscillations cover or exceed any possible inaccuracy in positioning the document 4 so as to insure that at some point in the resultant motion the necessary alignment of the two images is obtained. Any suitable mechanism for producing the necessary oscillatory motion is provided, as is schematically indicated at 21.

For example, a motor 22 drives shaft 23 through belt 24. Rotation of this shaft causes a slow rotation of cam disk 26 through worm gear 27 (Fig. 8). At the same time, a cam 28 oscillates mirror 5 rapidly about axis 5a by means of cam follower 29 and return spring 31. Arm 32 passes through axis 5a and is bent at a slight angle as shown; this arm terminates in a cam follower 33 which is also urged against cam disk 26 by return spring 31; this spring is mounted at such an angle that a different component of its bias force urges cam followers 33 and 29 against their respective cams. Rotation of cam disk 26 causes mirror 5 to oscillate about its other axis 5b, as will be apparent from Fig. 8. Thus there is a slow sweep of the mirror about axis 5b while it is oscillating rapidly about axis 5a, and the composite effect is to produce a total scan of an area in which the point of coincidence of image and mask is certain to lie.

A phototube or photocell 12 is placed behind the template 5. The electrical output of the phototube will go through variations similar to those shown in Fig. 4 every time the combined oscillation sweeps the image through a position of "total darkness" or coincidence, which is identical to the position in which the template lines were drawn in the first place. Due to the presence of both slow and fast oscillation the actual signal output of the phototube will have the form shown in Fig. 6; there will be times, due to the slow oscillation when there will be no condition of total darkness at all during the entire fast oscillation cycles, and at other times total darkness will only be approached. The waveform shown in Fig. 6 extends above and below the zero axis (unlike Fig. 4) because of passage through the A.-C. amplifier. It will be noted in Fig. 6 that the intervals between groups of fast pulses are

shown at *b*, while the finer oscillations produced by the "fast" frequency are shown at *a*. A tuned circuit 14 is provided which is tuned to the frequency of the "fast" oscillations representing the highest-frequency component "a" of the complex oscillation of Fig. 6. This is the frequency determined by the pitch of the lines 3 in Fig. 1 and by the image velocity at the time of total or almost total coincidence. This frequency does not appear as a sustained oscillation, but is characterized by successive "bursts" as shown in Fig. 6; the tuned circuit 14 has characteristics analogous to those of a sound board or resonant chamber used in building up the sound from a percussion or string instrument, and as a result the output of the amplifier will build up to a high signal of some duration containing this high-frequency component in almost pure form. The peculiar form of the "burst" in the input signal of Fig. 6 is such as to provide a high degree of excitation to the resonant circuit. This excitation is completely absent or very much reduced, if the pitch of the lines differs from the correct value by even a small amount, and, of course, it is also absent if the slope or curvature of said lines differs from those of the original. Therefore, the document will give rise to a higher amplifier output only if the fine engraving is accurate in every detail, at least over the area projected. Since a would-be imitator has no way of knowing which area is being projected, the entire engraved surface would have to be simulated to a high degree of accuracy for the document to pass the test.

When the amplifier circuit signal reaches a high level due to the resonance of tuned circuit 14, as explained, a thyratron is triggered, which in turn energizes a relay 17 to operate the motor 18. This motor feeds the document through a set of rollers into a suitable compartment of the machine. At the same time, a vending machine 19 dispenses merchandise or any other desired item. In the event that the document does not pass the test, suitable means may be provided for rejecting it, but such means are well known in vending machines and form no part of the present invention.

While the present arrangement shows a means for comparing the images by transmitting light through the document itself, it will be apparent that reflected light from one surface of the document could equally well be employed, and also that negative images could be employed instead of positive images, etc. It will also be apparent that different means for oscillating the images relative to each other may be employed, such as actual physical oscillation of one or both of the two images to be superimposed or of the plate 5 bearing the matrix.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction and arrangement within the scope of my invention as defined in the appended claims.

I claim:

1. Apparatus for identification of engravings, said engravings comprising a surface bearing a plurality of spaced, approximately parallel lines of a particular unique configuration and of substantial width, separated by spaces of different reflectance from said lines, said apparatus comprising a complementary surface bearing lines corresponding in configuration to the spaces of said first surface but of greater width, means for optically superimposing said two surfaces to produce a uniform optical effect over the combined surfaces when the two sets of lines are complementary and positionally matched, shifter means for shifting said surfaces with respect to each other in a first direction substantially perpendicular to at least some of said lines to produce a variation in the combined optical effect at a particular frequency determined by the distance between said lines and the speed of said shifting, photoelectric means responsive to said variations in optical effect to produce electrical signals at said particular frequency of occurrence corresponding to said variations, circuit means responsive to said signals, and tuned to said

frequency to produce a control signal at a predetermined amplitude of said signal frequency.

2. The invention according to claim 1, said shifter means comprising means for oscillating said surfaces with respect to each other at a first frequency.

3. The invention according to claim 2, said shifter means comprising further means for shifting said superposed surfaces in a second direction in an oscillatory manner at a slower frequency than said first frequency.

4. Apparatus for identification of documents having a plurality of equally spaced approximately parallel lines of a particular unique configuration and of substantial width separated by spaces of different reflectance from said lines comprising; a mask including a complementary surface having only a plurality of equally spaced lines corresponding to the configuration of said spaces between the lines of said documents; means for optically superimposing an image of said parallel lines upon the lines of said mask; shifter means for shifting said image with respect to said mask in a first direction perpendicular to at least some of said lines for a distance which is equal to the width of a plurality of said lines to produce a variation in the combined optical effect at a particular frequency determined by the distance between the lines and the speed of said shifting, photoelectric transducer means positioned adjacent to said mask and responsive to the variations of illumination to produce electrical signals at said particular frequency of occurrence; circuit components responsive to said electrical signals and adjusted to resonance at said frequency to produce a control signal at a predetermined amplitude; and electrical means for sensing the amplitude and frequency of said control signals.

5. Apparatus for identification of documents as set forth in claim 4 wherein said parallel lines are straight.

6. Apparatus for identification of documents as set forth in claim 5 wherein said shifter means includes an oscillating mirror as part of said optical system, said direction of oscillation being substantially at right angles to said straight lines.

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Appendix F

PETITIONS FOR THE WRIT OF CERTIORARI CITING 35 U.S.C. 112

71-132	Motor City Metal Treating, Inc. v. Kolene Corp. et al
71-363	Beckman Instruments, Inc. v. Reeves Instruments et al
71-485	Gottschalk v. Benson & Tabbott
71-503	Whitcomb v. General Dynamics Corp. et al
71-967	Wahl etc. v. Carrier Manufacturing Company
71-1147	Ford Motor Co. v. Ellipse Corp.
72-294	L. Goldstein's Sons, Inc. v. Trio Process Corporation
72-841	Eclipse Fuel Engineering Co. v. Maxon Premix Burner Co., Inc.
72-951	Salem Equipment Inc., et al v. Koekum Industries, Inc.
72-1127	The O. M. Scott & Sons Co. v. Noll & Fortunato
72-1161	General Motors Corporation v. Devex Corporation et al
72-1400	Carter Wallace, Inc. v. William N. Otte, trustee etc.
72-1534	The D. S. Brown Co. etc. v. Acme Highway Products Corp.
73-131	Penn Yan Boats, Inc. v. Sea Lark Boats, Inc. etc.
73-187	Kewanee Oil Co. v. Bicron Corp. et al
73-313	R. Lee Fraser v. Continental Realty Corp. et al
73-429	Idas B. White v. Harrington Manufacturing Co.
73-454	Phillips Petroleum Co. v. Karl Ziegler
73-496	Unarco Industries, Inc. v. Swanson et al
73-833	Harold W. Doyle v. Commissioner of Patents